

Design and Implementation of AVR Based Seat Vibrator System in Bus for Destination Alert and Accident Detection

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Abstract

Public Transportation in many Countries is being used as a means of transport for travelling and accordingly people would prefer this public transportation. The gentle rocking motion of a bus is enough to full the weariest of travellers off to sleep on a journey, meaning you may miss your stop, but now we are introducing a project to alert the travellers when they reached the destination also it is useful for physically challenged people. A large number of precious lives or lost due to road traffic accidents every day, the common reasons are driver's mistake and late response from emergency services. There is a need to have an effective road accident detection and information communication system in place to save injured persons. A system that sense information messages to the respective guardian about the accident and accident location. A monitoring switch is used to monitor the status of the seats and a vibrator is used to alert the passengers through vibrations when they reach their destination. An accelerometer sensor is used to detect the accident and GSM is used to send messages to their respective guardian about the accident and GPS is used to track the exact location, we provide a android application that controls the overall operation of the conductor, the application provide booking of seats and helps to find the passenger is travelling in the bus without proper ticket by informing the popup not booked and the destination of the passenger is fixed by the android app with a respective seat numbers.

Key words: AVR, ATmega328, Bluetooth, GP, Vibration motor.

1. Introduction

In public transport system like buses recently none of the new technologies are implemented but only changes in the facilities like air conditioning, DVD coach, speakers, inner lighting system and external look of the bus. Obviously it shows the luxury of the bus. Our proposed methodology is the newest feature for public transport system. It alerts the travellers when they reach the destination, for alerting a vibrator is installed in the seat with a monitoring switch. Vibrator is used to alert the passenger by a vibration and monitoring switch is used monitor the status of the seat whether it is occupied or not. This provides the methodology to make the conductor less bus.

In other countries the same technology is already in use by providing the GSM based android app, it alerts the passenger by a ringtone or vibration in a phone, but it fails to alert when mobile is switched off or the phone is in silent mode this is the major drawback of the project. But our project is to overcome this drawback by installing a vibrator to each seat. This project provides an android app to fix the destination of the passenger, to find the number of passengers in the bus and also helps to find out the any passengers travelling without proper ticket. The android app uses the GPS to find destination based on the longitude and latitude of the preferred destination.

ATmega-328 is basically an Advanced Virtual RISC (AVR) micro-controller. It supports the data up to eight bits. ATmega-328 has 32KB internal built-in memory. It operates ranging from 3.3V

to 5V. It has an ability to store the data even when the electrical supply is removed from its biasing terminals. Its excellent features include the cost efficiency, low power dissipation, programming lock for security purposes, and real time counter with separate oscillator. It's normally used in Embedded Systems applications.

ATmega-328 has 1KB Electrically Erasable Programmable Read Only Memory (EEPROM). This property shows if the electric supply supplied to the micro-controller is removed, even then it can store the data and can provide results after providing it with the electric supply. Moreover, ATmega-328 has 2KB Static Random Access Memory (SRAM). ATmega-328 has several different features which make it the most popular device in today's market. These features consist of advanced RISC architecture, good performance, low power consumption, real time counter having separate oscillator, 6 PWM pins, programmable Serial USART, programming lock for software security, throughput up to 20 MIPS etc. ATmega-328 is mostly used in Adriano.

2. Literature Survey

The AVR is a family of microcontrollers developed by Atmel. These are modified Harvard architecture 8-bit RISC single chip microcontrollers. AVR was one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to one-time programmable ROM, EEPROM used by other microcontrollers at the time.

The ATmega328 is a single-chip microcontroller created by Atmel in the mega AVR family. The ATmega328 and ATmega8 are pin compatible ICs but functionally they are different. The ATmega328 has flash memory of 32KB, where the ATmega8 has 8KB. Other differences are extra SRAM and EEPROM, addition of pin change interrupts and timers. [1].

Bluetooth is a wireless technology standard for exchanging data over short distances (using short – wavelength UHF radio waves in the ISM band from 2.4 to 2.85 GHz) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 30,000 member companies in the areas of telecommunication, computing, networking and consumer electronics [4]

Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touch screen mobile devices such as smart phone and tablets. In addition, Google has further developed Android TV for televisions, Android Auto for cars, and Wear OS for wrist watches, each with a specialized user interface. Variants of Android are also used on game consoles, digital cameras, PCs and other electronics. [3]

The population of our present world has increased tremendously which in turn leads to some new changes in the human kind. In accordance with the basic necessities, the comfort living of human life with the luxuries and life styles are also customized in such a way that, instead of using public transportation every individual want to have their own vehicle, which may result in heavy traffic and unnecessary accidents. By this the number of private vehicles increased a lot which resulted in more number of accidents and as well as pollution which is going to be a great loss to this environment. On the other hand there is no security for the vehicles as they are getting stolen by thieves easily. The accident discovery and identification of exact location is the overall idea of the project.

With a new technology through which one can effectively one can know about his vehicle conditions. For this the paper adopted two different technologies namely embedded and android. Embedded technology is used to determine the accident using accelerometer sensor and android technology is used to determine the name of that location instead of latitude and longitude values so that even a layman can understand these values and can know about the vehicle location and android app that specifies the location name when the mobile receives the GPS data plays a major role in the paper. Thus, with this a user could be knowing about his vehicle location and condition through which positioning and locating a vehicle can be done in an easy and simply manner with less cost and more effectiveness.

In our project Accident detection and Messaging system is done through GSM, GPS and Android technology which is used to inform the respective passenger guardian about the accident. This system is not only efficient but also worthy to be implemented. The accelerometer is fitted in the vehicle and based on the positioning of the bus the accident is detected. Accident detection and messaging system execution is simple as the system makes use of GSM and GPS. GPS is used to track the exact location and GSM is used to send the messages to the respective guardian mobile [7].

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Initially developed by Android Inc., which Google bought in 2005, Android was unveiled in 2007, with the first commercial Android device, launched in September 2008. The operating system has since gone through multiple major releases, with the current version being 8.1 "Oreo", released in December 2017. The core Android source code is known as Android Open Source Project (AOSP), and is primarily licensed under the Apache License.

Android is also associated with a suite of proprietary software developed by Google, including core apps for services such as Gmail and Google Search, as well as

the application store and digital distribution platform Google Play, and associated development platform. These apps are licensed by manufacturers of Android devices certified under standards imposed by Google, but AOSP has been used as the

basis of competing Android ecosystems, such as Amazon.com Fire OS, which utilize its own equivalents to these Google Mobile Services.

3. Design And Implementation A Block Diagram

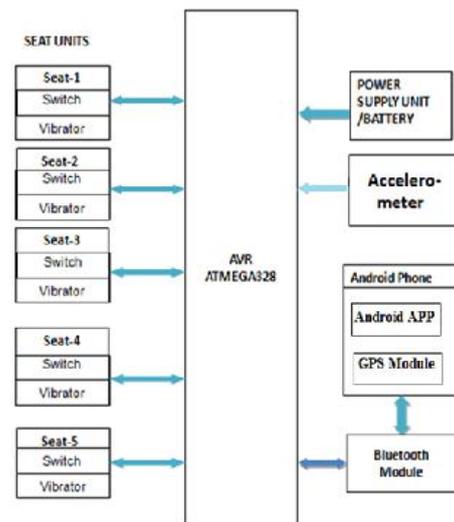


Fig. 1 Block Diagram of proposed Methodology

The block diagram consist of IC ATMEGA328, arduino board, Bluetooth receiver, vibrator, monitoring switch, android application, accelerometer sensor and power supply. ATMEGA328

is a 8 bit microcontroller used to control the I/O operation and allow transmission and receiving of data. ARDUINO board is a 14 pin board used to connect the IC to provide power supply, ground and to establish the connections to different blocks, the main function of this unit is to monitor all inputs and control output units accordingly. Bluetooth receiver is used to establish the connection between module and Bluetooth with a data rate of 16MHz.

Arduino Uno Board

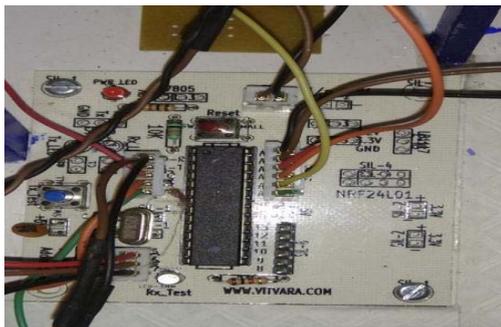


Fig. 2 Adriano board pin

Arduino Uno is a microcontroller board based on the ATMEGA328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button.

The main function of this unit is to monitor all inputs and control output units accordingly.

Monitoring Switch



Fig. 3 Monitoring switch

To interface a push button or switch to the Controller, all we need is just the push button or the switch itself and an accompanying pull-up resistor as shown in fig. In this configuration, the bit that will enter to the Controller's port is HIGH (1) if the push button is not pressed. If the push button is pressed, the bit that goes inside the computer is LOW (0). This is so since the input port will be connected directly to ground if the push button is pressed.

If the push button is pressed, the bit that goes inside the computer is LOW (0). This is so since the input port will be connected directly to ground if the push button is pressed.

4. Results And Discussions

The main aim of our project is to implement a AVR based seat vibration system in buses for destination alert. The use of this proposed model is to alert the passengers when they reach their destination by using vibration motor and to detect accident using accelerometer by the position of the bus.

Initial stage: On power up, all the vibrators will be vibrated for initialization.

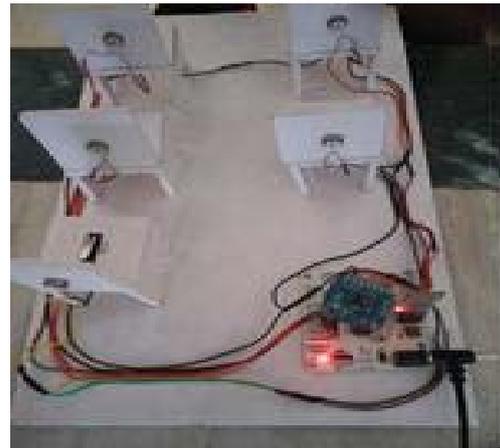
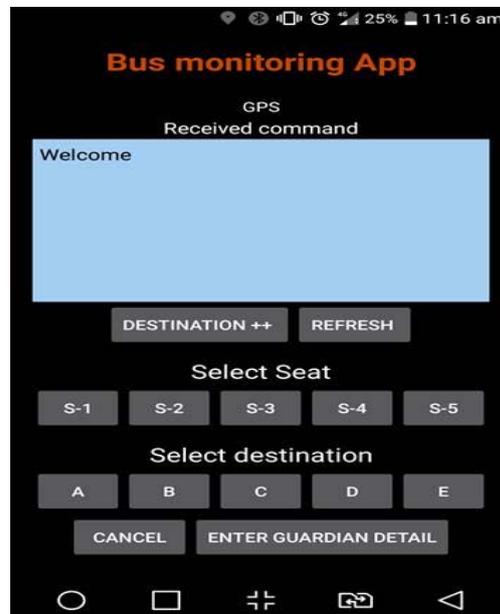
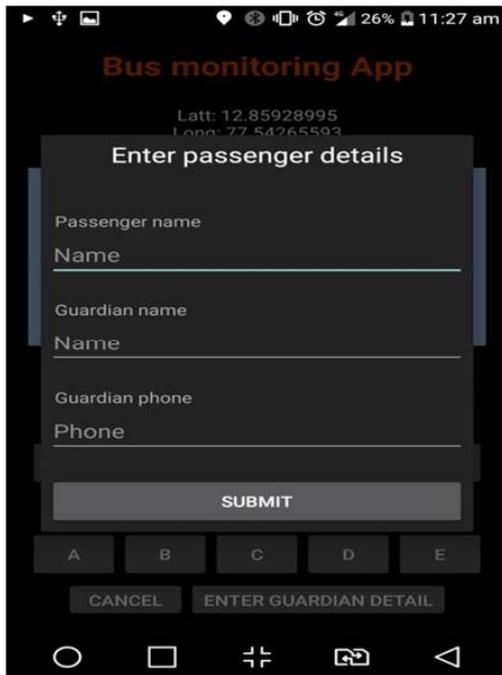


Fig. 3 Overall model

Second stage: At this stage the welcome message will be displayed on the android app.



Booking stage: In this stage the passenger selects his/her seat and need to enter the destination and guardian details.

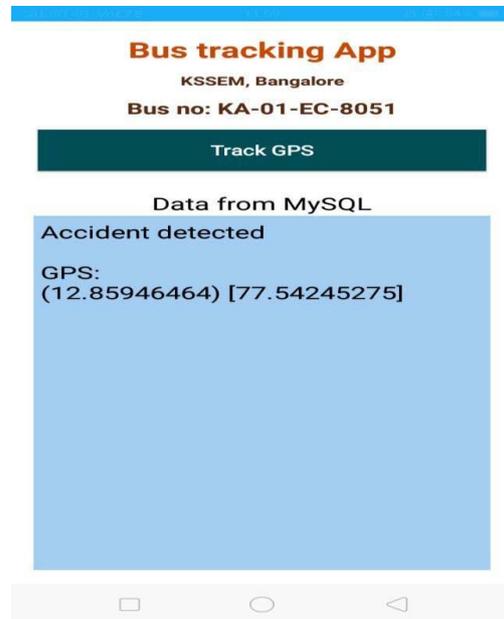


Destination stage: Once the destination is reached the seat will vibrate and the status will be displayed.



Accident detection stage: If the passenger meets with an accident in his/her journey, the accident detected pop up message will be shown in the app.

5. Conclusion



Our aim is to alert the passengers when they reach the destination and to intimate their respective guardians about the accident occurred. This system consists of AURDINO UNO, IC ATMEGA328, Reset button, monitoring switch and vibration motor. The power supply of 5-12V is given to the AURDINO board and it is reset for initialization. Vibrators are placed under seats which are connected to the aurdino board. There is a module placed in the entrance of the bus. Whenever the passenger enters the bus he/she should select the respective seats and destination in the module.

A popup notification is sent to the respective mobile that the seat is reserved for the particular passenger. The monitoring switch is placed under the seats on seat. The switch is closed then it sends signal that seat is occupied. When the destination is reached, the vibrators alert the passenger by vibrating. During the journey, when the bus meets with an accident, based on the angle of deviation the accident is detected. A popup is sent to the guardian and can track where exactly the accident is detected. All this functions work accordingly to the program. An interesting new feature for those lucky to be able to use public transport.

6. Future Work

The future scope of the project is to update the entire details to KSRTC server with new updated android app that linked with KSRTC server. It updates information about bus like number of passengers travelled, travelled route, collection in each day and travelled distance.

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